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Konishi et al.

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(54) **WATER DISINTEGRABLE CLEANING UTENSIL**

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(73) Assignee: **Uni-Charm Corporation**, Ehime (JP)

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(51) **Int. Cl.**
A47K 11/10 (2006.01)

(52) **U.S. Cl.** **15/210.1**; 15/222; 15/226

(58) **Field of Classification Search** 15/210.1, 15/222, 150, 226
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,470,653	A	11/1995	Honeycutt et al.	
7,127,768	B2 *	10/2006	Blum et al.	15/104.94

FOREIGN PATENT DOCUMENTS

EP	1166707		1/2002
JP	62-186833	A	8/1987
JP	9-503426		4/1997
JP	2001-064858		3/2001
JP	3105217		8/2004
JP	2004-298650		10/2004
WO	WO-96/04136		2/1996

OTHER PUBLICATIONS

International Search Report dated May 16, 2006 issued for corresponding International Patent Application No. PCT/JP2006/307944.
Official Action from corresponding Japanese Patent Application No. 2005-141435 issued Jun. 15, 2010 with English translation, 6 pages.

* cited by examiner

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(57) **ABSTRACT**

A water disintegrable cleaning utensil of the present invention has: a cleaning part, at least part of which is formed by a wet shrinkable resin being hydrophilic and shrinkable at least in one direction when absorbing water; and a holding part which holds the cleaning part. By this structure, the water disintegrable cleaning utensil is very effective at cleaning both in a dry and in a wet condition and is disintegrable in water when being disposed of after being used.

5 Claims, 7 Drawing Sheets

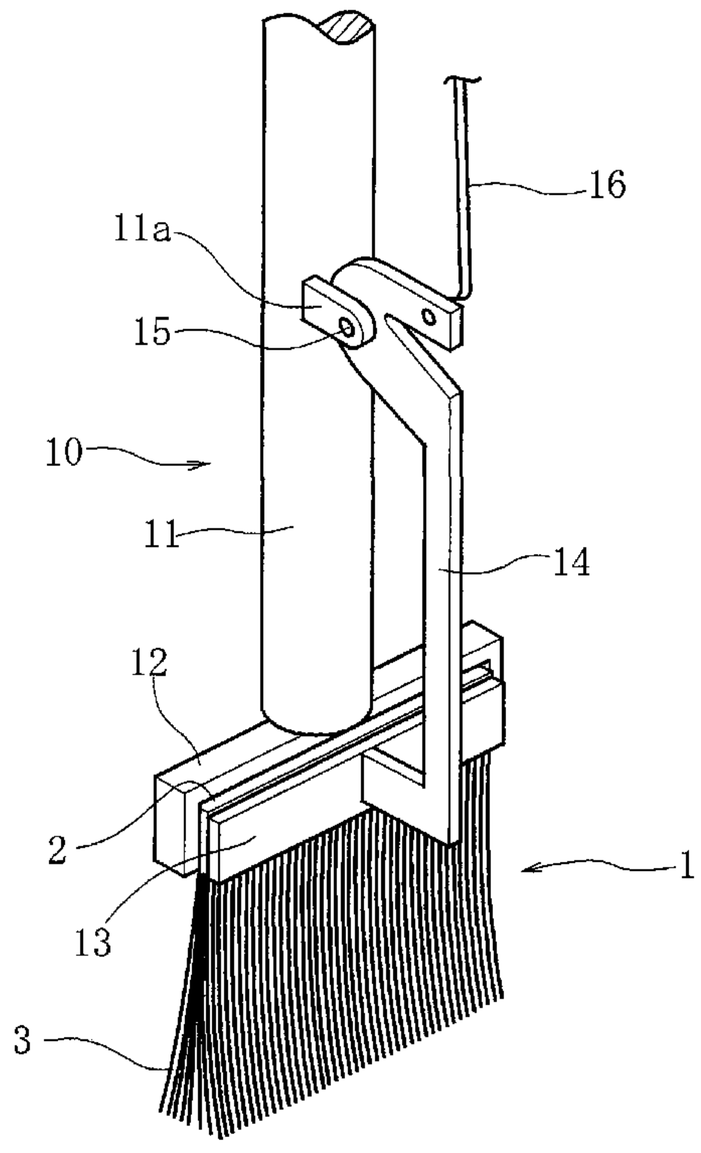


FIG. 1

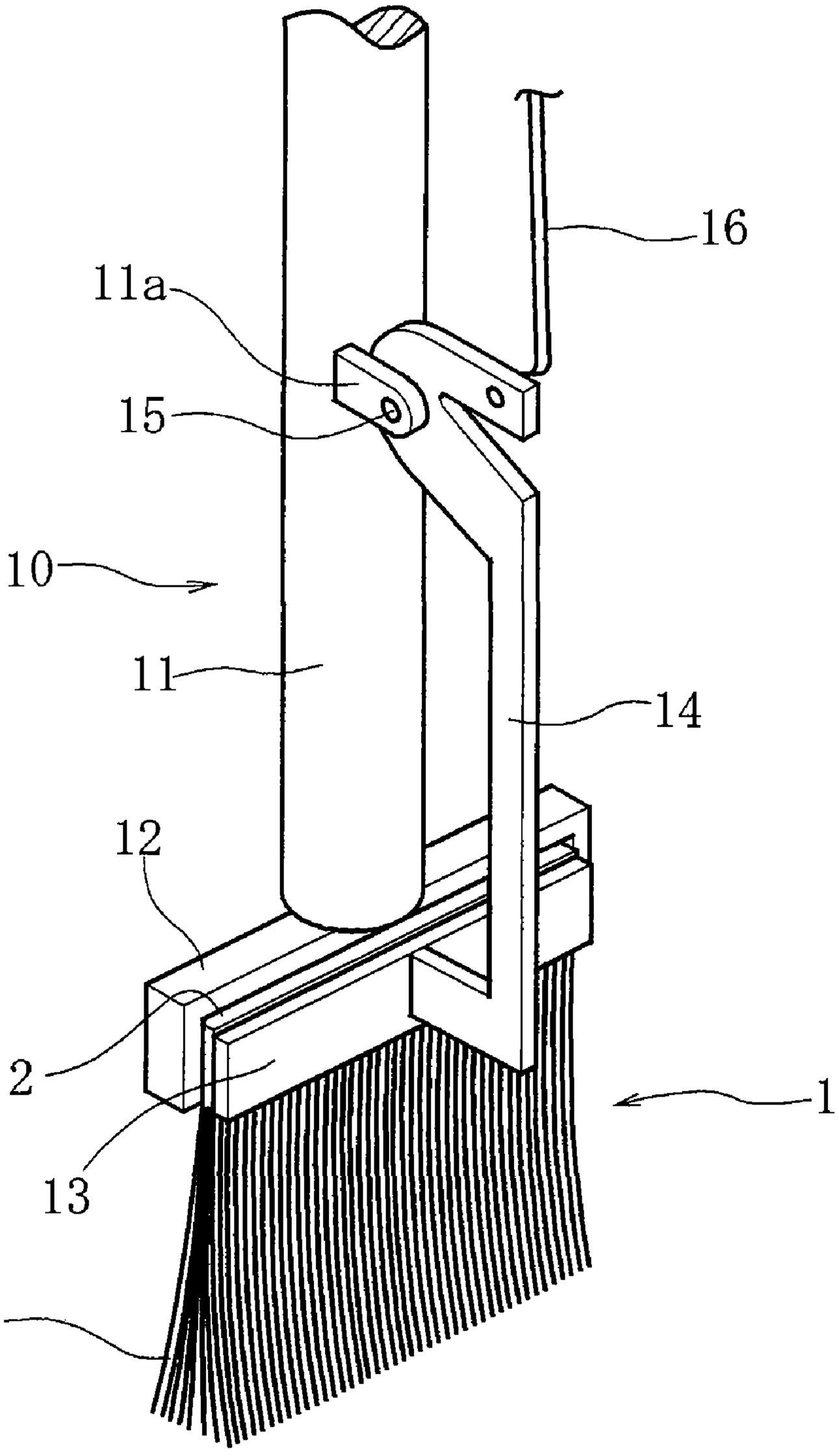


FIG. 2A

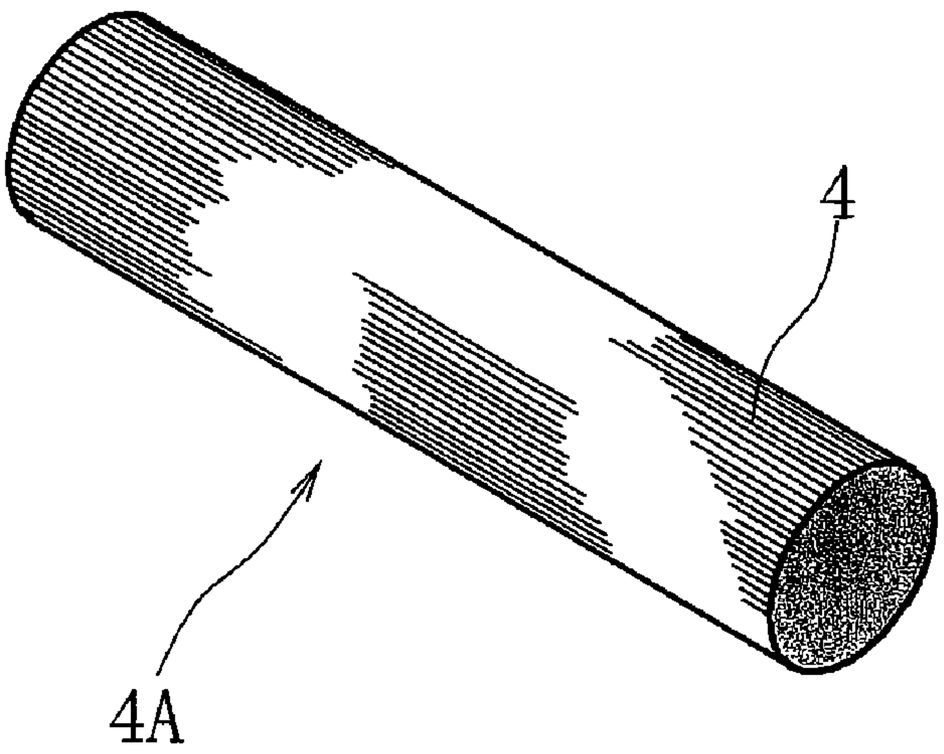


FIG. 2B

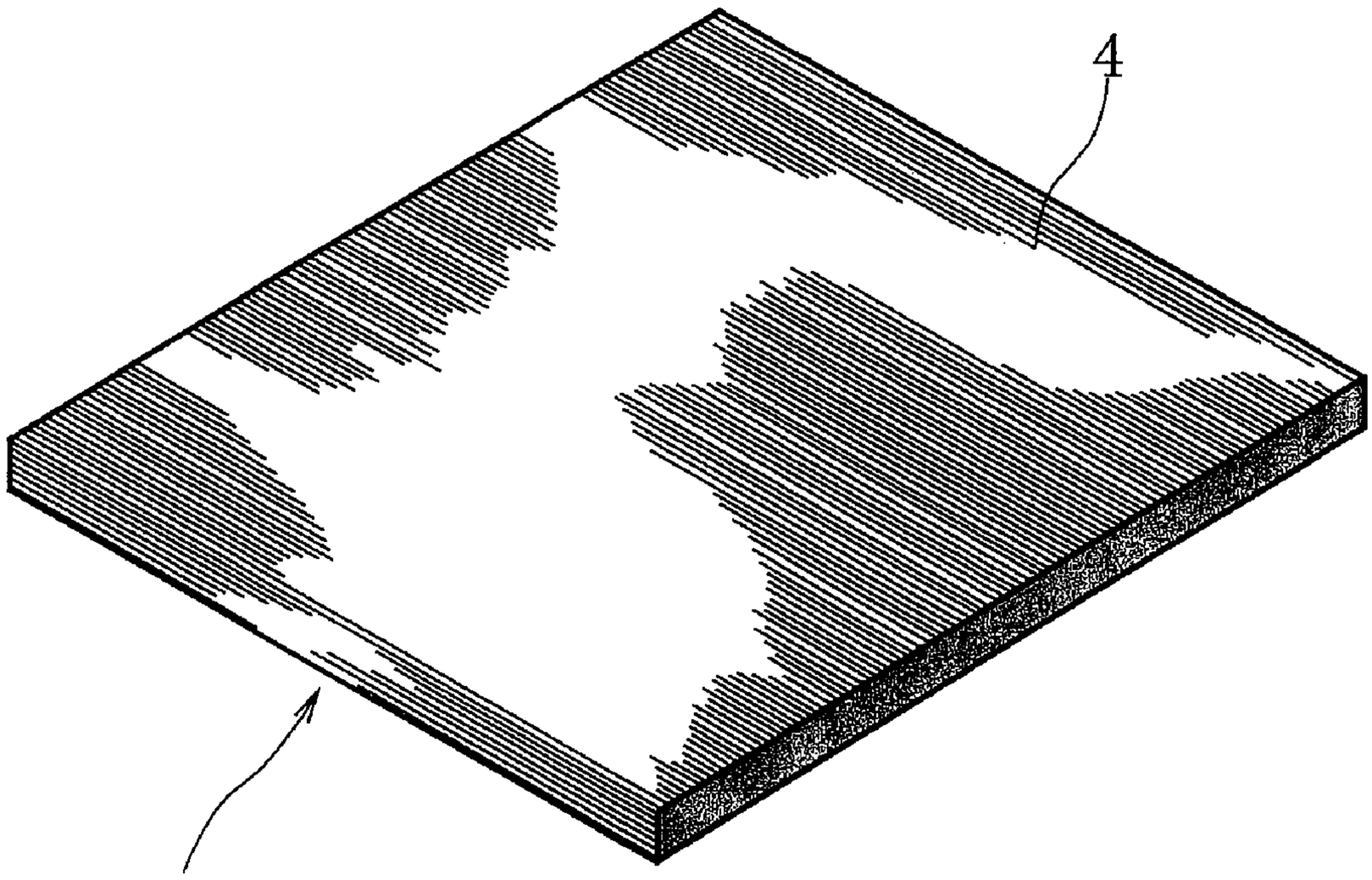


FIG. 3A

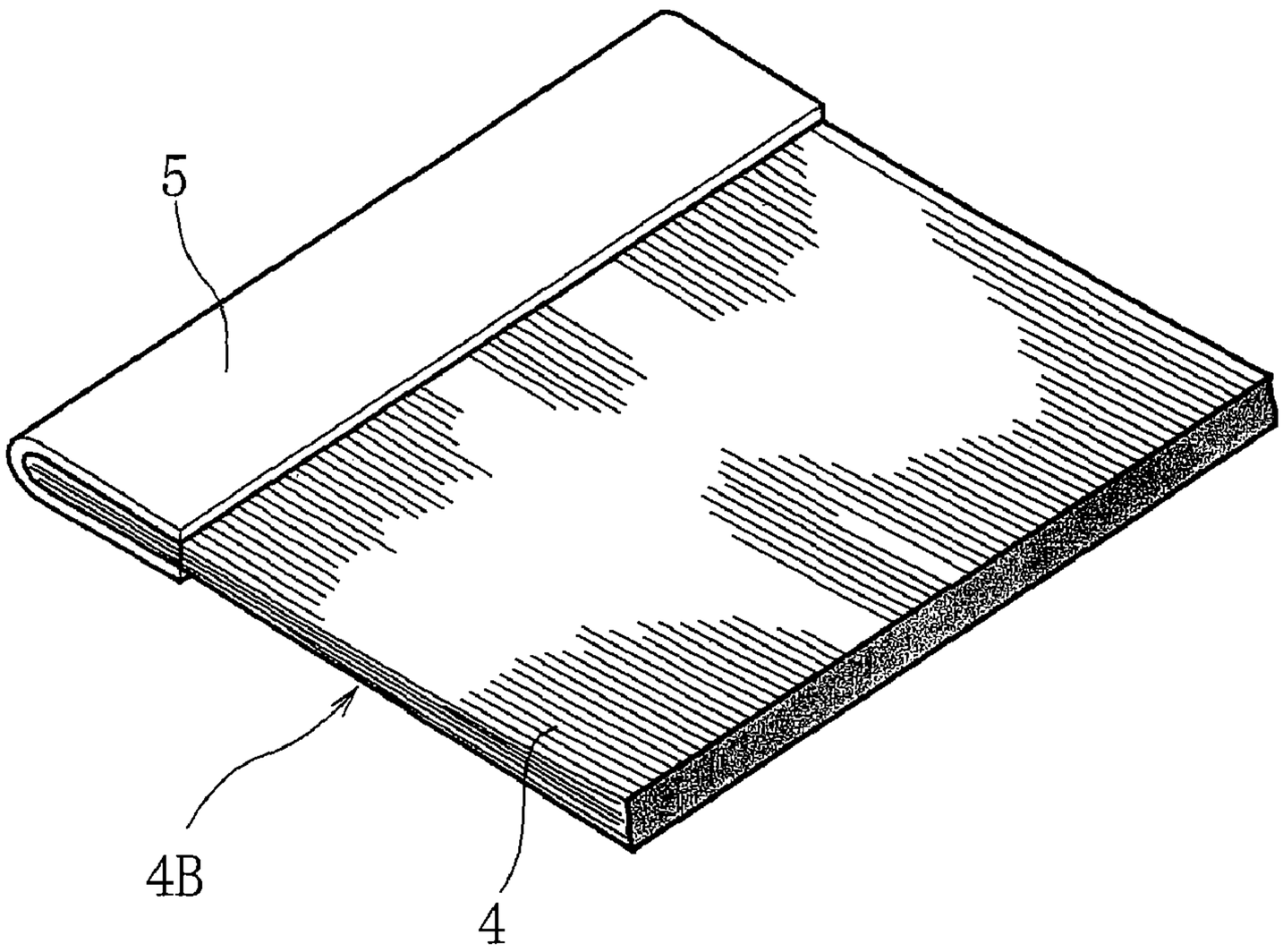


FIG. 3B

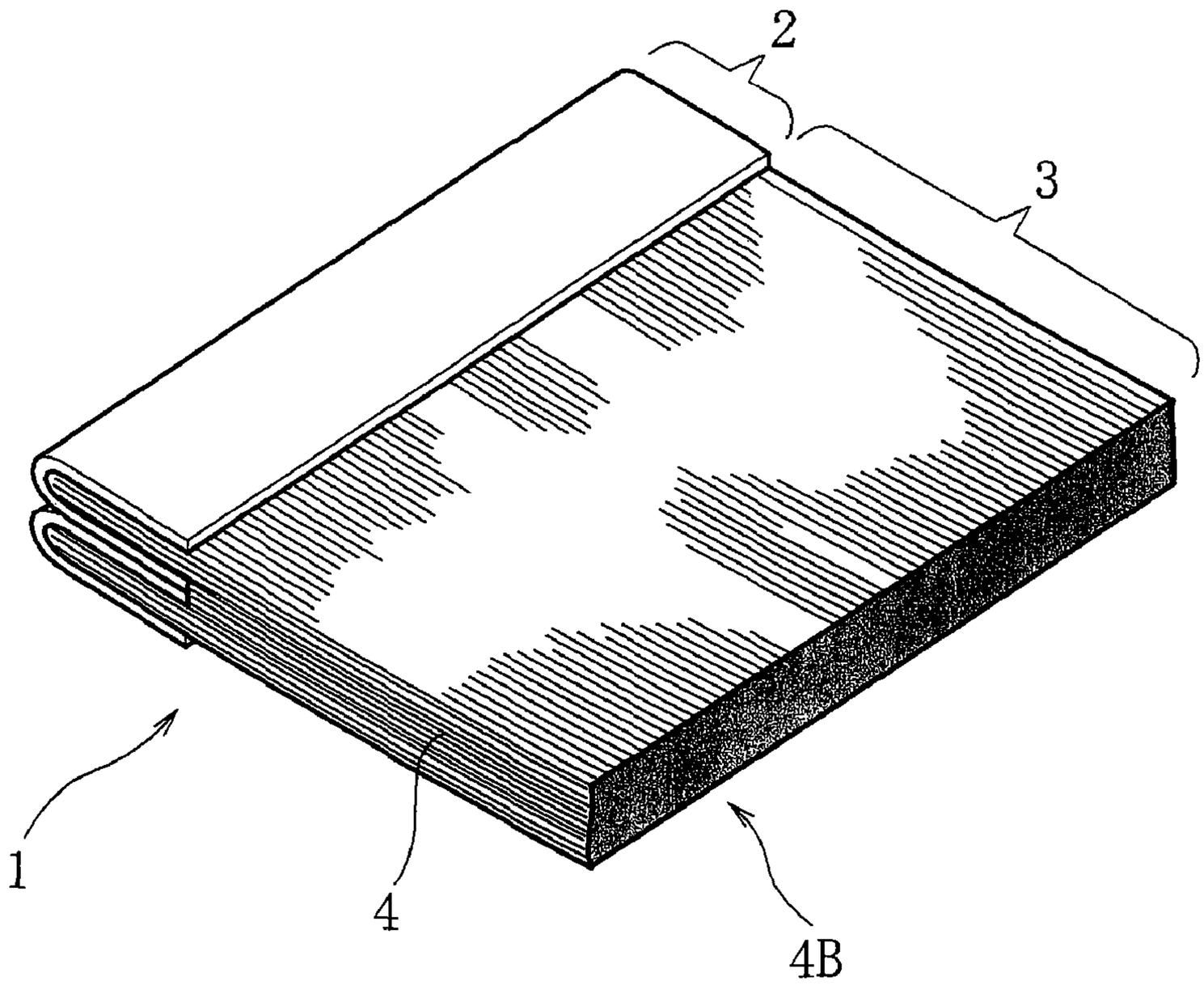


FIG. 4

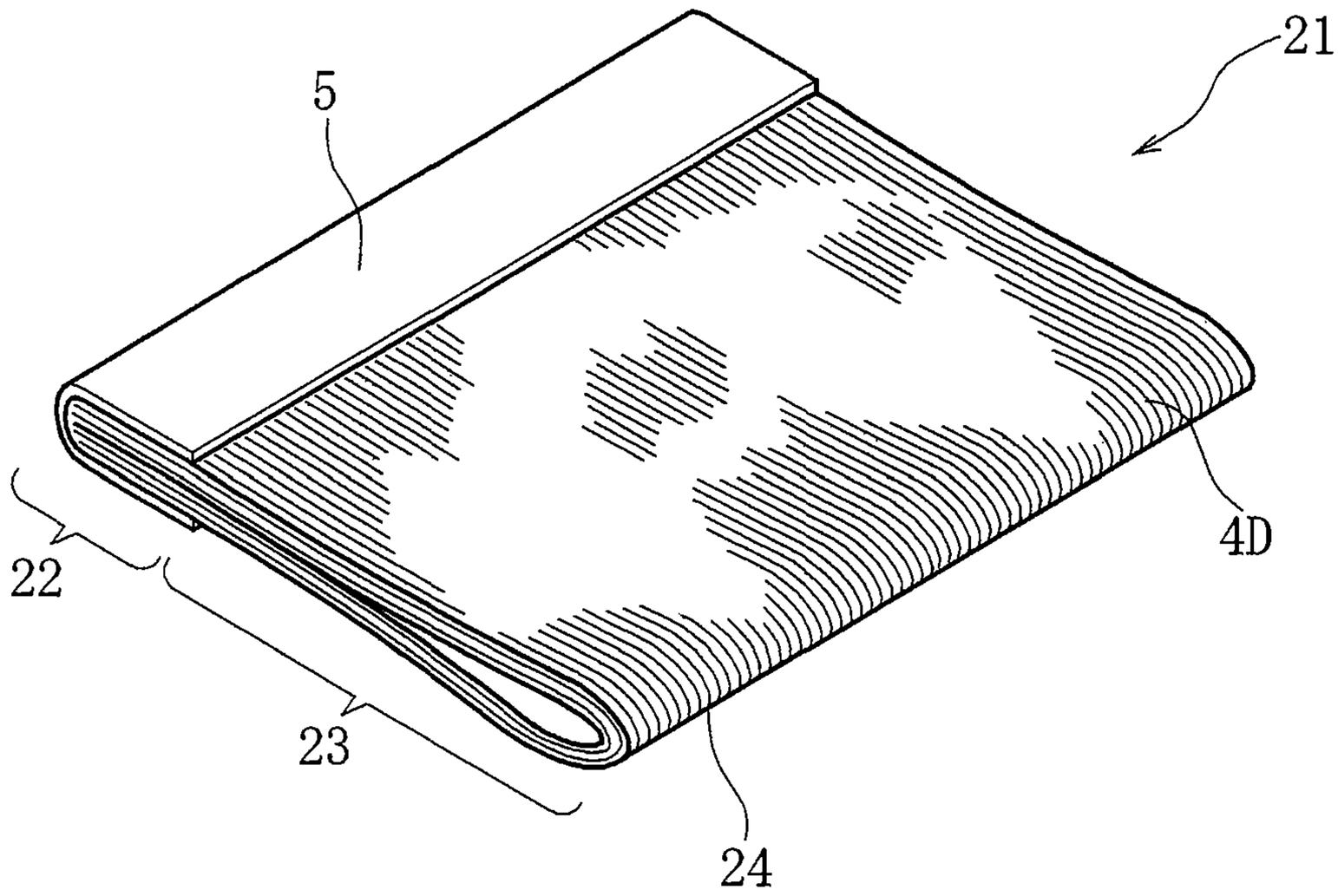


FIG. 5

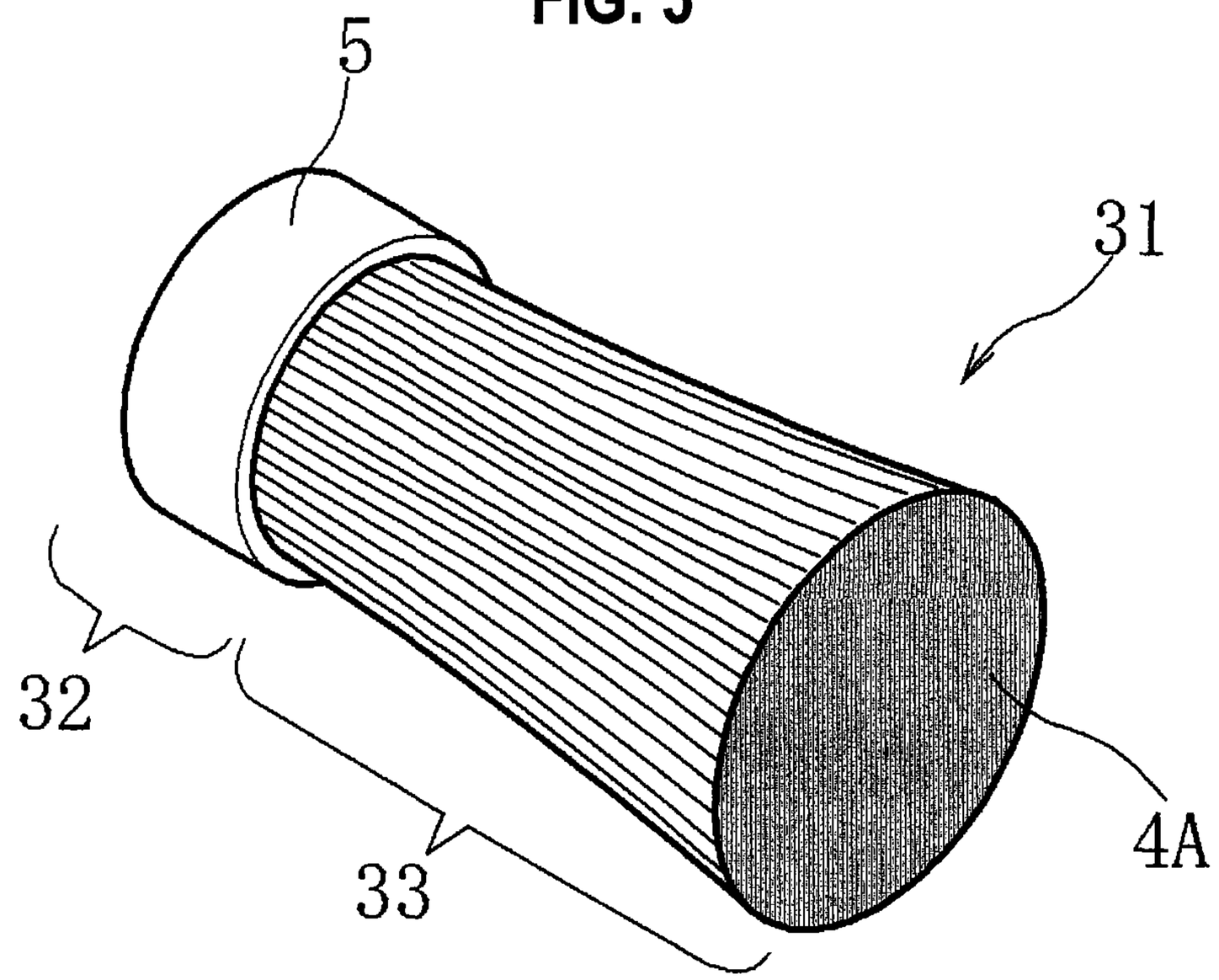


FIG. 6

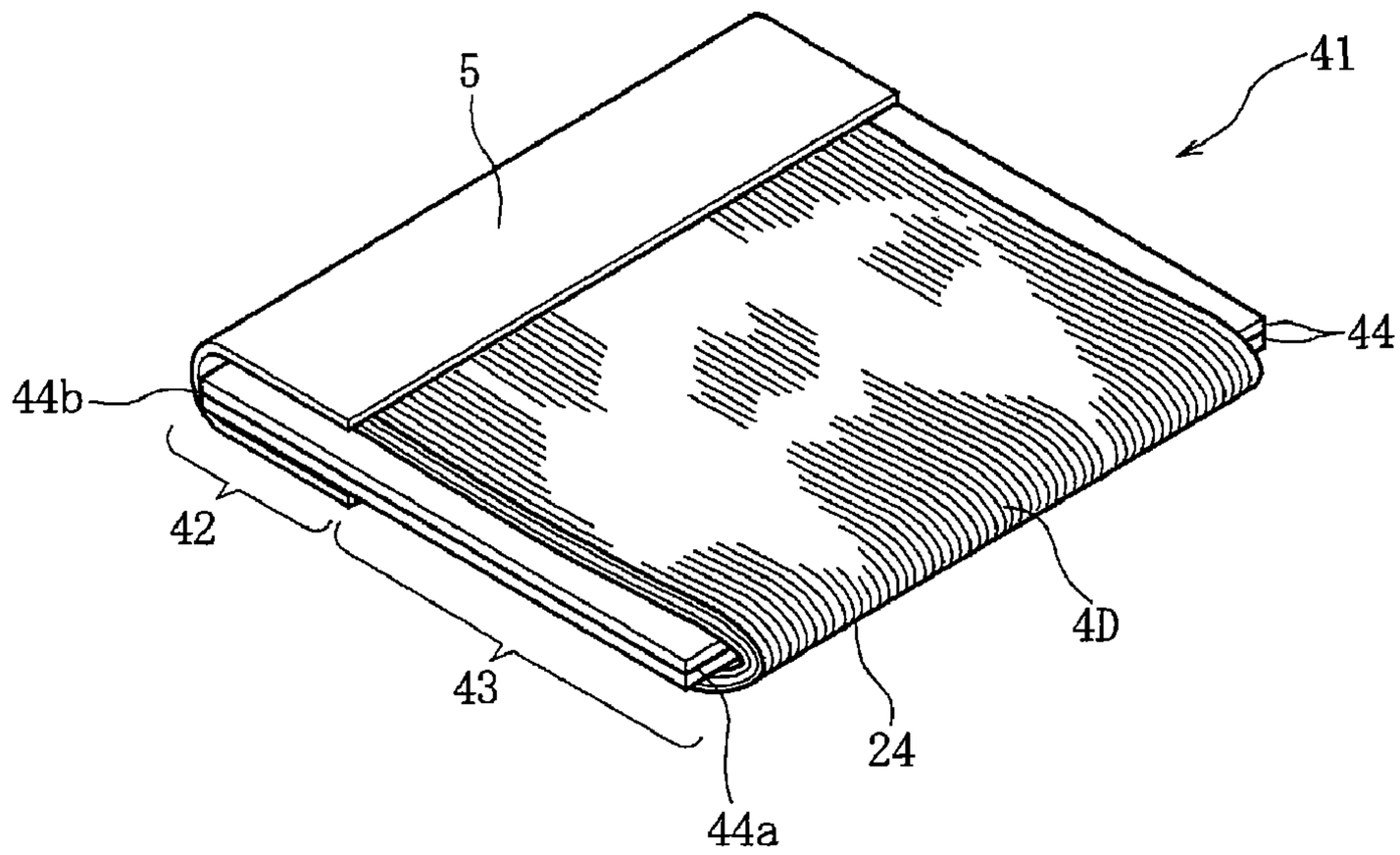


FIG. 7

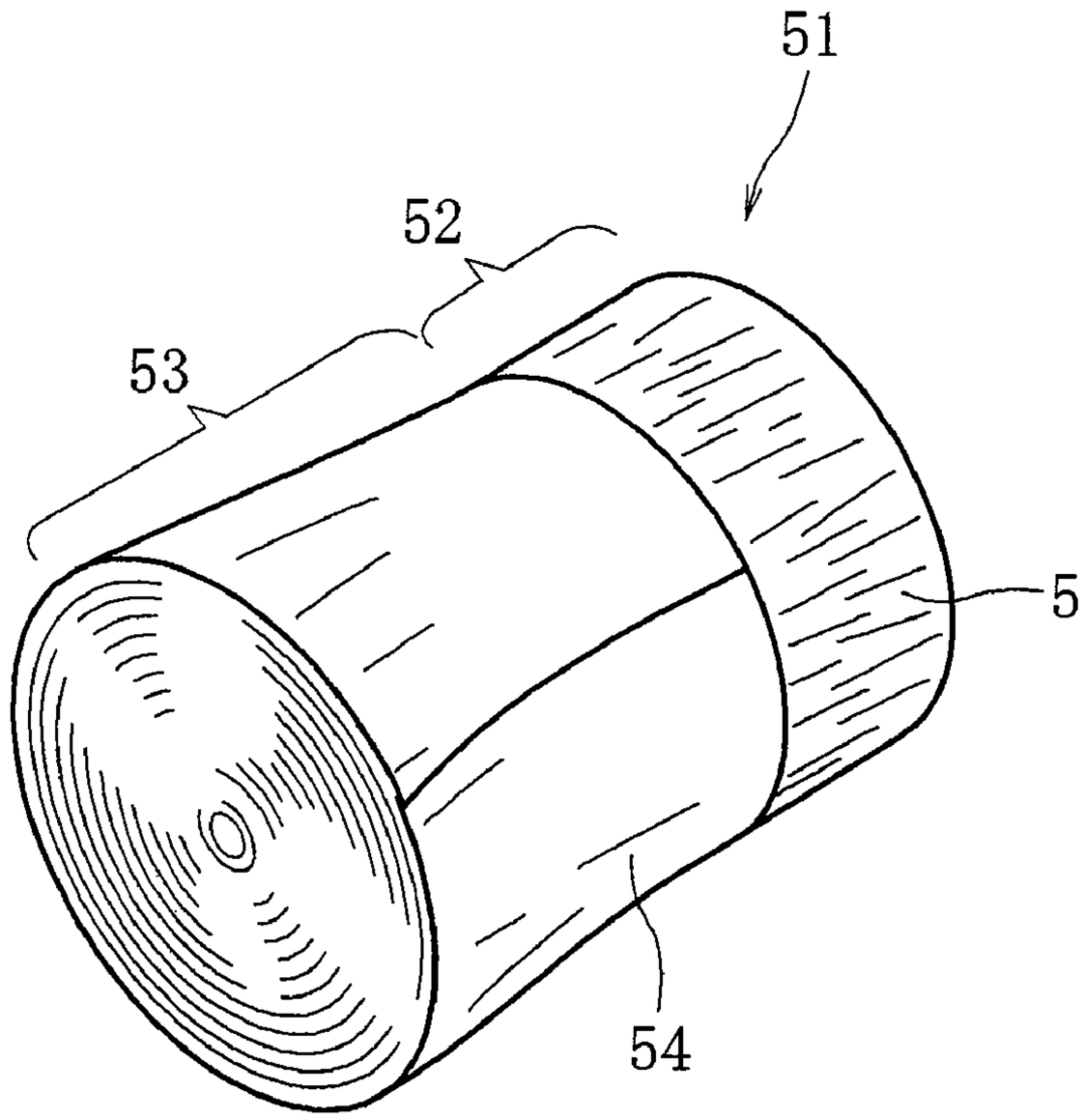


FIG. 8

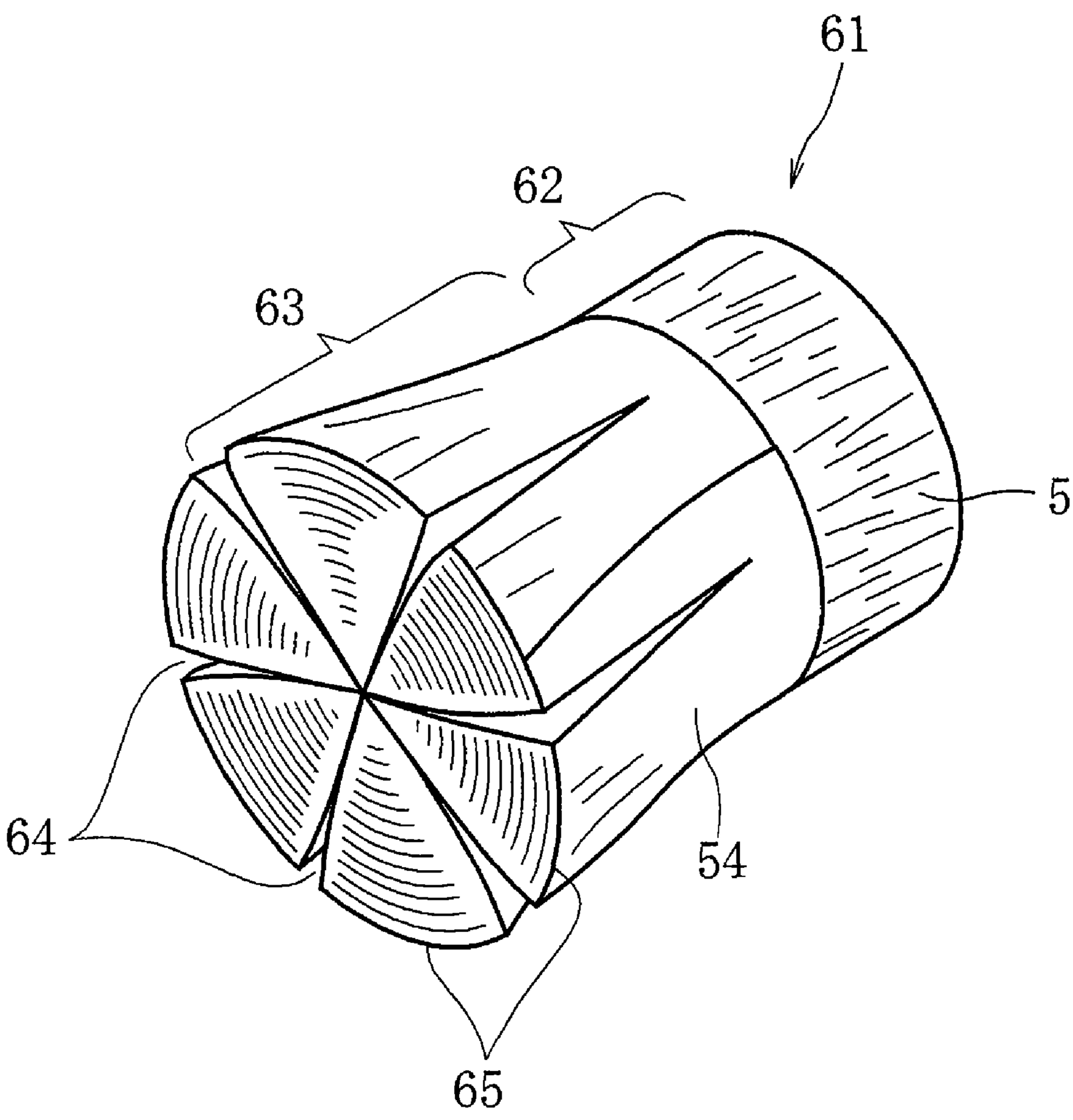
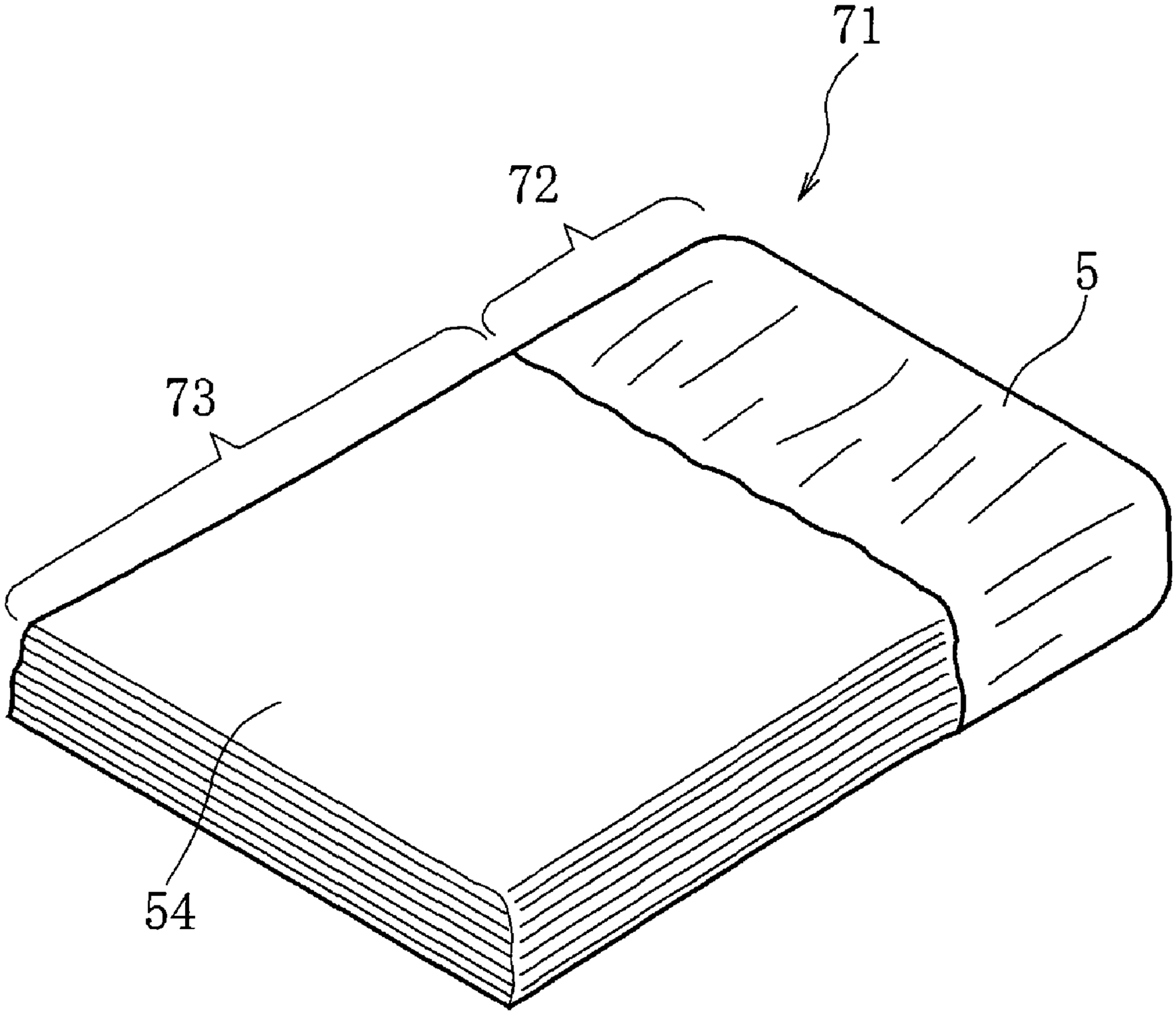


FIG. 9



WATER DISINTEGRABLE CLEANING UTENSIL

INCORPORATION BY REFERENCE

This application claims the benefit of priority from Japanese Patent Application No. 2005-141435, filed May 13, 2005, which is incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a water disintegrable cleaning utensil capable of wiping and cleaning both in a dry and in a wet condition and disposable in water after being used.

2. Description of the Related Art

Japanese Patent Unexamined Publication No. S62-186833 discloses an invention related to a disposable toilet cleaning brush used for cleaning a flush toilet.

The toilet cleaning brush uses paper made of short fibers being woody pulp and of a binder such as CMC. Pluralities of slits are formed on the paper. The paper is wound up into a brush. The toilet cleaning brush is fixed to the end of a handle made of paper. After a toilet bowl has been swept with the toilet cleaning brush, the toilet cleaning brush and the handle are disposed of in a flush toilet and disintegrated in water. The above application also states that wax is applied to the surface of the brush to adjust a time during which the paper is dissolved.

SUMMARY OF THE INVENTION

According to the specification of Japanese Patent Unexamined Publication No. S62-186833, since it takes only 10 to 20 seconds to clean a toilet bowl, the bowl can be cleaned before the paper composing the toilet cleaning brush dissolves in water.

However, the toilet cleaning brush formed by the paper made of woody pulp fixed with water soluble CMC decreases in bonding strength between the fibers at the time when it touches water in cleaning the toilet bowl, significantly decreasing in paper strength, which makes it difficult to wipe out dirt sticking on the bowl. In the brush to which wax is applied, a wax component inhibits the paper from dissolving, so that it takes the brush a long time to dissolve inside a septic tank.

Since the brush formed by paper is extremely soft, even when a dry part to be cleaned is cleaned by the toilet cleaning brush, it is difficult to effectively remove dust and trash.

The present invention has been made to solve the above conventional problems and has for its purpose to provide a water disintegrable cleaning utensil effective at removing dirt both in a dry and in a wet condition and disintegrable for a shorter time when it is disposed of in the bowl of a flush toilet after being used.

According to one aspect of the present invention, there is provided a water disintegrable cleaning utensil comprising: a cleaning part at least part of which is formed by a wet shrinkable resin being hydrophilic and shrinkable at least in one direction when absorbing water; and a holding part which holds the cleaning part.

In the water disintegrable cleaning utensil according to the present invention, a wet shrinkable resin forming the cleaning part fulfils its function in sweeping trash and dust in dry condition. When it is used for cleaning a bowl in the flush toilet, the wet shrinkable resin of the cleaning part absorbs water, shrinks, and turns into a mass-shaped soft aggregate. The aggregate is suited to rub off dirt sticking to the toilet bowl and the like.

For example, according to the present invention, the cleaning part is provided with a large number of fibers made of a wet shrinkable resin, and the fibers made of the wet shrinkable resin are formed by a tow.

It is preferable that the fiber made of the wet shrinkable resin decreases in length by 20% or more when absorbing ion exchange water with a temperature of 20° C. weighing three times more than the fiber.

In the present invention, the cleaning part is provided with film made of a wet shrinkable resin. In this case, the film made of the wet shrinkable resin can be provided with a plurality of strips separated by cuts.

According to the present invention, the holding part can be structurally provided with a water disintegrable holding material for holding the wet shrinkable resin, thereby the shape of the holding part can be kept in dry condition, which makes it possible to clean with the holding part held in the hand, or attached to the holder.

Therefore, the present invention is such that a holder is provided for detachably holding the holding part. The use of the holder makes it possible to firmly hold the cleaning utensil in cleaning both in a dry and a wet condition and to dispose of the utensil in a flush toilet without touching it after use.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to the accompanying drawings wherein;

FIG. **1** is a perspective view showing a water disintegrable cleaning utensil held by a holder according to a first embodiment of the present invention;

FIGS. **2**A and **2**B are perspective views showing a manufacturing process for the water disintegrable cleaning utensil according to the first embodiment, FIG. **2**A is a perspective view showing a tow made of fibers used for the cleaning utensil, and FIG. **2**B is a perspective view showing a bundle made of fibers used for the cleaning utensil;

FIGS. **3**A and **3**B are perspective views showing a manufacturing process for the water disintegrable cleaning utensil according to the first embodiment, FIG. **3**A is a perspective view showing the bundle provided with a holding member, and FIG. **3**B is a perspective view showing a finished cleaning utensil;

FIG. **4** is a perspective view showing a water disintegrable cleaning utensil according to a second embodiment;

FIG. **5** is a perspective view showing a water disintegrable cleaning utensil according to a third embodiment;

FIG. **6** is a perspective view showing a water disintegrable cleaning utensil according to a fourth embodiment;

FIG. **7** is a perspective view showing a water disintegrable cleaning utensil according to a fifth embodiment;

FIG. **8** is a perspective view showing a water disintegrable cleaning utensil according to a sixth embodiment; and

FIG. **9** is a perspective view showing a water disintegrable cleaning utensil according to a seventh embodiment.

DETAILED DESCRIPTION OF THE PREFERED EMBODIMENT

Hereinafter, description will be made of embodiments of the present invention with reference to the drawings.

FIG. **1** shows a state where a water disintegrable cleaning utensil according to the present invention is held by a holder. FIGS. **2**A and **2**B and FIGS. **3**A and **3**B show the water

disintegrable cleaning utensil according to the first embodiment held by the holder illustrated in FIG. **1**.

A wet shrinkable resin in the present invention refers to a wet shrinkable fiber or film used in the shape of a fiber or film. In other words, the "wet shrinkable resin" refers to such that a fiber absorbs water to swell, thereby shrinking and decreasing in length by 20% or more, or film absorbs water to swell and to thicken, thereby decreasing in area by 20% or more.

FIG. **3**B shows a water disintegrable cleaning utensil **1** according to the first embodiment. The water disintegrable cleaning utensil **1** has a holding part **2** and a cleaning part **3**. The holding part **2** of the cleaning utensil **1** is detachably attached to a holder **10** shown in FIG. **1**.

The holder **10** shown in FIG. **1** is provided with a supporting part **12** integrally formed on the tip of a handle part **11** made of synthetic resin and a pressing part **13** opposing the supporting part **12**. The supporting surface of the supporting part **12** is flat and that of the pressing part **13** opposing the supporting part **12** is also flat. The supporting part **12** opposes the pressing part **13** so that the supporting surfaces are in parallel with each other. The pressing part **13** is integrally formed with a lever **14** which is rotatably and pivotably supported by a bracket **11***a* formed on the handle part **11** through a shaft **15**. An operation wire **16** is rotatably connected to the upper part of the lever **14**.

A torsion spring (not shown) is attached to the shaft **15** to energize the lever **14** clockwise in the figure using the shaft **15** as a fulcrum, thereby energizing the pressing part **13** in the direction in which the pressing part **13** approaches the supporting part **12**. The upper portion of the handle part **11** is provided with a handle to which an operation lever is attached. The operation wire **16** is a thick wire, and the upper end thereof is connected to the operation lever. When the operation lever is pulled upward, the lever **14** is rotated counterclockwise to cause the pressing part **13** to leave the supporting part **12**. At this point, the holding part **2** of the cleaning utensil **1** is inserted between the supporting part **12** and the pressing part **13** and then the operation lever is released, thus the holding part **2** of the cleaning utensil **1** is held between the supporting part **12** and the pressing part **13** by the energizing force of the torsion spring.

With the cleaning utensil **1** held in the holder **10**, a dry part such as a floor around a toilet bowl and a wet part inside the toilet bowl can be cleaned with the cleaning part **3** of the cleaning utensil **1**. It is possible to wipe the toilet bowl by the cleaning part **3** wetted with water reserved in the toilet bowl. After cleaning work has ended, the operation lever is pulled upward to release the pressing force by the pressing part **13**, thereby disposing of the cleaning utensil **1** without touching the cleaning utensil **1**.

The cleaning part **3** of the cleaning utensil **1** is formed by fibers **4** made of wet shrinkable resin that shrinks when absorbing water. The fibers **4** made of wet shrinkable resin are formed by water soluble resin such as polyvinyl alcohol (PVA) resin or the like, or water swelling resin which absorbs water to swell. The fiber absorbs water to swell and, as a result, it shrinks and decreases in length. The fiber **4** used in the cleaning utensil **1** according to the present embodiment is PVA resin fiber of the product number "VPB101" by KURARAY CO., LTD., and its denier is 1.7 dtex. The fiber **4** is not subjected to a crimping treatment and is not shrunk. The fiber **4** preferably ranges in denier from 0.6 to 7.8 dtex.

The fiber **4** to be used will absorb water weighing three times or more than the original weight of the fiber. The fiber **4** decreases in length by 20% or more when absorbing ion exchange water with a temperature of 20° C. weighing three times more than the original weight of the fiber.

FIG. **2**A shows a tow **4**A being a bundle of the fibers **4**. The tow **4**A made of a large number of the fibers **4** is mechanically (physically) compressed, as a result of which, an intermolecular contacting force between the fibers brings the fibers **4** into close contact with each other, keeping a cylindrical shape. The tow **4**A is continuous. When the cleaning utensil **1** is manufactured, the tow is cut into about 30 mm to 100 mm in length, for example, into 50 mm in length to use it. Formation of the cleaning part **3** by the tow **4**A falling within the range of the length mentioned above causes the cleaning part to facilitate function as a brush to remove trash and dust. Even when the tow is flushed down the toilet, it is easily flowed into a septic tank without clogging pipes as long as the fibers fall within the range of the length mentioned above.

As shown in FIG. **2**B, the tow **4**A cut into the above length is spread in the direction perpendicular to the fiber to form a flat fiber bundle **4**B with a predetermined width and thickness. When the fiber bundle **4**B is formed, mechanical (physical) bonding state between the fibers **4** in the tow **4**A (i.e., state where the fibers are compressed to be contacted by an intermolecular contacting force) is left at least part of the fiber bundle **4**B without passing through a process in which the tow **4**A is opened and each fiber is dispersed. Preferably 50% or more, and more preferably 70% or more of the fibers in the fiber bundle **4**B are kept contacted by the intermolecular contacting force.

The fiber bundle **4**B is an aggregate of fibers made of uncrimped PVA resin. Since the fibers **4** are brought into close contact with each other and kept contacted mechanically (physically), the fiber bundle **4**B is high in stiffness and elasticity.

As shown in FIG. **3**A, one end of the fiber bundle **4**B is covered with a holding material **5**, and the inside surface of the holding material **5** and the fiber bundle **4**B are bonded to each other by water soluble adhesive. Although the above article shown in FIG. **3**A can be used as the cleaning utensil **1**, in the cleaning utensil **1** according to the first embodiment, as shown in FIG. **3**B, a plurality of cleaning unit bodies, each being formed by the fiber bundle **4**B and the holding material **5**, are stacked and the holding materials **5** of the cleaning unit bodies are bonded to each other by water soluble adhesive.

As shown in FIG. **1**, when the cleaning utensil **1** is used, the holding part **2** is held between the supporting part **12** of the holder **10** and the pressing part **13**. For this reason, the holding part **2** of the cleaning utensil **1** needs to keep its shape until it is attached to the holder **10**, but does not need to firmly hold the fiber bundle **4**B. The holding material **5** is formed by water disintegrable paper strengthened by hydrogen bonding force by making natural fiber such as pulp fiber into paper or by making natural fiber such as pulp fiber and regenerated cellulose fiber such as rayon yarn into paper. The holding material **5** may be water disintegrable paper of which pulp fiber or rayon yarn is bonded with such binder as PVA or carboxymethyl cellulose (CMC) or the like. Alternatively, the holding material **5** may be formed by water-soluble resin film such as PVA film and the like.

The fiber bundle **4**B and the holding material **5** may be subjected to pressure in the holding part **2** or subjected to embossing finish for heating and pressing to be bonded by providing a mechanical compressive force for the holding part **2** and the fiber bundle **4**B. It is allowable to use both bonding by the above water-soluble adhesive and the embossing finish.

The fiber bundle **4**B provided at the cleaning part **3** of the cleaning utensil **1** forms a brush in which the fibers are brought into close contact with each other and aggregated, as is the case with the tow **4**A. The brush part is high in stiffness

and elasticity. When a dry part such as a floor around a toilet bowl in a flush toilet is swept by the brush of fiber bundle **4**B, dust such as hairs and cotton dust and trash on the floor are intertwined between the fibers **4** and removed.

When the inner surface of the toilet bowl is cleaned by the cleaning part **3** of the cleaning utensil **1**, impregnating the cleaning part **3** with water causes the fibers **4** to absorb water and shrink so that the fibers **4** decrease in length. A part of the fibers dissolves, and the fibers are bonded together, thereby PVA resin fibers turn into a mass with high density. The mass has absorbed a large quantity of water and exhibits a cushion property like a sponge.

When the surface of the toilet bowl is rubbed with the mass made of PVA resin fiber that has absorbed water, the mass having high density and exhibiting cushion property is brought into close contact with the inner surface of the toilet bowl and the cushion property can extend its contact area. Rubbing the bowl surface with this mass can remove dirt sticking on the surface. Pressing the mass of the PVA resin fibers on the bowl surface causes water contained in the mass to exude between the mass and the bowl surface, and the water effectively removes dirt caked on the bowl surface.

After cleaning, the cleaning utensil **1** is disposed of in the toilet bowl and flushed with wash water, then a large amount of water separates the holding material **5** from the fiber bundle **4**B (an aggregate of PVA resin) and the fiber bundle **4**B disperses in the water, flows into a septic tank without clogging pipes, and dissolves on the way to the septic tank or in the tank. Moreover the fibers in the holding material **5** are decomposed.

As described above, the cleaning utensil **1** is effective as a brush when cleaning a dry part such as the floor. After cleaning the dry part has been finished, it can also effectively remove dirt on the toilet bowl by wetting it. The toilet bowl and the periphery thereof can be cleaned with a single cleaning utensil **1**, moreover the utensil can be disposed of in the flush toilet after cleaning.

Any material may be used as wet shrinkable resin composing the fibers **4** used in the cleaning part **3** provided that it is water soluble resin or water swelling resin which is hydrophilic, shrinks when absorbing water, and is brought into close contact with each other to turn into a mass. It is preferable to use biodegradable resin. For example, modified polyvinyl alcohol resin with a molecular structure effective in thermal plasticity can be used. Starch fiber and align fibers may be used. It is preferable that the fibers **4** to be used in the cleaning part **3** can absorb water weighing three times or more than the original weight of the fiber, as mentioned above, the fiber decreases in length by 20% or more when absorbing ion exchange water with a temperature of 20° C. weighing three times more than the original weight of the fiber.

As stated above, the use of resin which can absorb water weighing three times or more than the original weight of the fiber and decreases in length by 20% or more when absorbing ion exchange water with a temperature of 20° C. weighing three times more than the original weight of the fiber causes fibers to aggregate into mass in a wet state and exhibits cushion property, thereby the bowl surface can be easily wiped up.

FIGS. **4** to **9** show a water disintegrable cleaning utensil in the other embodiments according to the present invention.

A water disintegrable cleaning utensil **21** in the second embodiment shown in FIG. **4** is formed in such a manner that the tow made of PVA fibers cut into the length twice as long as the tow **4**A shown in FIG. **2**A and is spread in the direction perpendicular to the fiber to form a fiber bundle **4**D. The fiber bundle **4**D is folded back at the position half the length of the bundle to form a loop part **24**. The ends of the fiber bundle **4**D are put together and bonded with water-soluble adhesive and covered by a holding material **5**. The holding material **5** and the fiber bundle **4**D are bonded with water-soluble adhesive to form a holding part **22**. The loop part **24** where the fiber **4**D is folded back is positioned at the distal end of a cleaning part **23**.

The cleaning utensil **21** is used in a state shown in FIG. **4**, or used as cleaning utensil in a state where a plurality of the utensils shown in FIG. **4** are put together and the holding materials **5** are mutually bonded with water soluble adhesive, as is the case with FIG. **3**B. In the cleaning utensil **21** shown in FIG. **4**, the loop part **24** of the fiber bundle **4**D appears at the distal end of the cleaning part **23**, so that a dry floor can be cleaned by the loop part **24**.

FIG. **5** shows a water disintegrable cleaning utensil **31** in the third embodiment according to the present invention. In a cleaning utensil **31** is used the tow **4**A in which the PVA fibers shown in FIG. **2**A cylindrically aggregate. The holding material **5** is wound about one end of the tow **4**A, and bonded with water-soluble adhesive to form a holding part **32**. The tow **4**A wound by the holding material **5** at the holding part **32** prevents the fibers composing the tow **4**A from decomposing before the tow **4**A is attached to the holder. For the holder for holding the cleaning utensil **31**, a supporting and a pressing part with cylindrical opposing surfaces are used instead of the supporting part **12** and the pressing part **13** shown in FIG. **1**.

In the cleaning utensil **31** shown in FIG. **5**, a cleaning part **33** is formed by the tow **4**A in which the fibers **4** made of PVA resin aggregate to be compressed and physically brought into a close contact with each other, so that the cleaning part **33** is high in stiffness. Trash and dust can be effectively removed when a dry place such as a floor is swept out by the cleaning utensil **31**. During cleaning an external force exerting on the tow **4**A of the cleaning part **33** loosens the fibers **4**, which turns into the most suitable brush.

A plurality of the tows **4**A shown in FIG. **5** may be arranged at the cleaning part and the proximal portion of the plurality of the tows **4**A may be fixed by the holding material **5** to form a cleaning utensil in which a plurality of cylindrical brush parts are formed.

FIG. **6** shows a water disintegrable cleaning utensil **41** in the fourth embodiment according to the present invention. A cleaning part **43** of the cleaning utensil **41** is composed of the fiber bundle **4**D made of PVA resin and a water disintegrable sheet **44**. The fiber bundle **4**D is the same as that used in the cleaning utensil **21** shown in FIG. **4**.

The water disintegrable sheet **44** is referred to as sheet pulp formed by stacked pulp fibers pressed in the shape of a sheet. The sheet pulp is kept in the shape of a sheet by the hydrogen bonding force of the pulp fiber. The sheet pulp may be such that pulp fibers are bonded together by water-soluble adhesive such as PVA. The sheet pulp has a basis weight of 500 g/m^2 to 1000 g/m^2, being higher enough in fiber basis weight than a water disintegrable paper (with a basis weight of about

10 g/m^2 to 30 g/m^2) used as the holding material **5**. The water disintegrable sheet **44** formed by sheet pulp is high in basis weight, density, and stiffness.

The cleaning utensil **41** is so formed that the water disintegrable sheet **44** is sandwiched between the folded-back fiber bundles **4**D formed by a widely spread tow. A loop part **24** of the fiber bundle **4**D is positioned outside the lower side **44***a* of the water disintegrable sheet **44**. The ends of the fiber bundle **4**D are aligned with the upper side **44***b* of the water disintegrable sheet **44**. The water disintegrable sheet **44** is bonded to the fiber bundle **4**D by water-soluble adhesive. The fiber bundle **4**D is covered with the holding material **5** and bonded thereto by water-soluble adhesive. It is allowable that the sheet **44**, fiber bundle **4**D, and the holding material **5** are stacked high and subjected to pressure in embossing, or heated and pressed to keep the shape of the holding part **42**, by using together with the above bonding, or instead of the above bonding.

The cleaning utensil **41** is so structured that the fiber bundle **4**D formed by the fiber **4** made of PVA resin is supported by the sheet **44**, providing the cleaning part **43** with stiffness while cleaning both in dry and in wet conditions, which enables the cleaning part **43** to be rubbed hard against a part to be cleaned such as a floor, a toilet bowl, and such. When the cleaning utensil **41** is disposed of in a flush toilet after cleaning, the cleaning utensil **41** is released from the constraint of the holding material **5** and separated into the fiber bundle **4**D, the sheet **44**, and the holding material **5**, and each is disintegrated in water.

It is possible that the cleaning utensil **1** shown in FIG. **3**B and the cleaning utensil **31** shown in FIG. **5** also use the foregoing water disintegrable sheet (sheet pulp) **44** together with the fiber **4** made of PVA resin. It is also possible to use a water disintegrable block formed three-dimensionally by fibers being 20 mm or less in length instead of the above sheet **44**. The water disintegrable block is such that fibers are compressed to bind them by hydrogen bonding force or fibers are bonded with each other by water-soluble binder.

FIG. **7** shows a water disintegrable cleaning utensil **51** in the fifth embodiment according to the present invention. The cleaning utensil **51** uses a film **54** formed by wet shrinkable resin that swells and shrinks in wet condition. The film **54** absorbs water to swell in the thickness direction, as a result of which it shrinks to decrease in area. The film **54** is formed by the same PVC resin as in the above resin **4**, capable of containing water weighing three times or more than the original weight of the film. The film **54** decreases in length in at least one direction of the film by 20% or more when containing ion exchange water with a temperature of 20° C. weighting three times more than the original weight of the film, or it decreases in area by 20% or more.

The film **54** is tightly wound in a cylindrical shape. The holding material **5** is wound around the periphery of a holding part **52**. The holding material **5** is bonded to the film **54** by water soluble adhesive. At the cleaning part **53**, the film wound in the cylindrical shape is not bonded with each other, so that it can freely move.

The cleaning utensil **51** is held by the holding part **52** attached to the holder. The holder for holding the cleaning utensil **51** uses a supporting and a pressing part with cylindrical opposing surfaces instead of the supporting part **12** and the pressing part **13** shown in FIG. **1**. The cleaning part **53** can remove trash and dust on a dry part to be cleaned such as a floor by the film **54** which is high in density because it is wound thereon in multiple turns. When the film **54** is wetted with water while cleaning a toilet bowl, the film **54** swells and shrinks, then bonds together, thereby PVA resin aggregates into a mass. The mass absorbs a large amount of water, and thus exhibits cushion property as is the case with the mass into which the wet fiber bundle turns, thereby easily removing dirt sticking to a bowl and the like.

FIG. **8** shows a water disintegrable cleaning utensil **61** in the sixth embodiment according to the present invention. In the cleaning utensil **61**, the same film **54** as in FIG. **7** is wound in a cylindrical shape. The holding material **5** is wound around the periphery of a holding part **62** and bonded by water-soluble adhesive. In a cleaning part **63**, the film wound in a cylindrical shape is cut into the direction along the winding axis to form a plurality of notches **64**. As a result, in the cleaning part **63**, the film is separated into a large number of strips to form a brush part **65**. The notches **64** do not extend to the holding part **62**. Therefore, the strips will not be separated before they are attached to the holder.

The cleaning part **63** may be formed in such a manner that cuts are formed in a ribbon-like film **54** with a prescribed pitch to form a large number of strips and then the film **54** is wound in a cylindrical shape.

The cleaning utensil **61** shown in FIG. **8** can remove trash and dust by the strips of the film **54** composing the brush part **65** when cleaning a dry part such as a floor and the like by the cleaning part **63**. The holder for holding the cleaning utensil **61** uses a supporting and a pressing part with cylindrical opposing surfaces instead of the supporting part **12** and the pressing part **13** shown in FIG. **1**.

FIG. **9** shows a water disintegrable cleaning utensil **71** in the seventh embodiment according to the present invention. The cleaning utensil **71** is formed in such a manner that a film **54** is folded back and stacked up in a plurality of stages, and the holding material **5** is wound around the proximal portion of the film **54** and bonded by water soluble adhesive to form a flat holding part **72**.

In the cleaning utensil **71** shown in FIG. **9**, a large number of a rectangular film **54** may be stacked and bundled to form the cleaning part **73** instead of folding back the film **54**. In this case also, it is possible that a plurality of cuts are made in the film **54** to form a large number of brush-shaped strips.

The water disintegrable cleaning utensil according to the present invention can achieve an excellent cleaning effect both in a dry and in a wet condition and is disintegrable in water when being disposed of after used.

Although the invention has been described above by reference to certain embodiments of the invention, it will occur to these skilled in the art that the invention is not limited to the embodiments described above, in light of the teachings. The scope of the invention is defined with reference to the following claims.

What is claimed is:

1. A water disintegrable cleaning utensil, comprising:

a convertible cleaning part at least part of which is formed by wet shrinkable resin, said resin being hydrophilic and shrinkable at least in one direction when absorbing water and said resin converting from fiber or film form to a hydrogen-bonded mass-shaped aggregate when contacted with water; and

a holding part which holds the cleaning part,

wherein the cleaning part is provided with a large number of fibers made of the wet shrinkable resin formed by a tow,

wherein the fibers are compressed and physically brought into a close contact with each other; and

wherein the fibers made of the wet shrinkable resin decrease in length by 20% or more when absorbing ion

exchange water with a temperature of 20° C. and weigh three times more after absorbing the ion exchange water than an original weight of the fibers.

2. A water disintegrable cleaning utensil according to claim **1**, wherein the cleaning part is provided with films made of the wet shrinkable resin.

3. A water disintegrable cleaning utensil according to claim **2**, wherein the film is provided with a plurality of strips separated by cuts.

4. A water disintegrable cleaning utensil according to claim **1**, wherein the holding part is made of a water disintegrable holding material for holding the wet shrinkable resin.

5. A water disintegrable cleaning utensil according to claim **1**, wherein the holding part is provided with a holder for detachably holding the holding part.

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